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IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

Applicant	:	Alexander FISCHER, et al.
Int'l Appl. No.	:	PCT/EP01/01932
Int'l. Filing Date	:	February 21, 2001
Priority Date	:	February 28, 2000
Title of the Invention	:	METHOD FOR MANUFACTURING A SURFACE-ALLOYED CYLINDRICAL ...

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Box PCT
Washington, DC 20231

Express Mail Mailing Label No. :

EL070211412US

Sir:

Prior to examination, please amend the above-identified patent application as follows:

IN THE SPECIFICATION:

Page 1, after the title, please delete "DESCRIPTION" and insert --BACKGROUND OF THE INVENTION--.

Page 2, before the paragraph which begins with "The object of the present," please insert --SUMMARY OF THE INVENTION--.

Page 6, before the paragraph, which begins with "The invention is explained," please insert -- BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 7, before the paragraph, which begins with "Figure 1shows," please insert --DETAILED DESCRIPTION OF THE INVENTION--.

IN THE CLAIMS:

Please amend claims 3, 6-11, and 14-21 to remove their multiple dependencies. A "marked-up" version of the amended claims is enclosed herewith in accordance with 37 C.F.R. 1.121 (c)(1).

--3. (Amended) The method according to claim 1, characterised in that the energy beam is split before the zone of incidence where a first part beam is deflected into the heating zone and melting zone and a second part beam is deflected behind the solidification front for thermal structural treatment.

--6. (Amended) The method according to claim 1, characterised in that a ≥3 kW diode laser with a variable optical system to adjust the linear focal width of 4 - 15 mm is used to form the energy beam.

--7. (Amended) The method according to claim 1, characterised in that before the beginning and at the end of a coating the linear focal width of the energy beam and the quantity of powder is reduced transverse to the feed direction.

--8. (Amended) The method according to claim 1, characterised in that the workpiece is constructed as a hollow cylinder and rotates about the energy beam in the downhand position during the coating whereby the energy beam which is held in a fixed position relative to the direction of rotation, achieves a continuous feed movement during the rotation in the direction of the axis of rotation to produce a flat alloying zone.

9. (Amended) The method according to claim 1, characterised in that at the beginning of alloying the energy beam has a point structure and continually increases in size together with the quantity of powder until it has reached the complete linear focal width after a rotation of the workpiece.

10. (Amended) The method according to claim 1, characterised in that at the end of the alloying during the last rotation of the workpiece the linear focal width and the quantity of powder are continuously reduced to zero.

11. (Amended) The method according to claim 1, characterised in that a hollow cylinder made of Al or Mg alloys having a bore diameter of 60 - 120 mm is treated at a depth of up to 200 mm.

14. (Amended) The device according to claim 1, characterised in that the energy beam units next to one another sweep several lines of the working surface simultaneously, if necessary with several powder supply devices.

15. (Amended) The device according to claim 1, characterised in that the energy beam unit is located in a fixed position relative to the direction of rotation inside the rotatable workpiece clamping device connected to a drive unit where the energy beam is directed from the energy beam head onto the workpiece surface, that the powder supply device is located beside the energy beam device.

16. (Amended) The device according to claim 1, characterised in that the powder is blown onto surface facing the beam either in the direction opposite to the feed direction through the beam into the melting zone or is sprinkled loosely in the direction of gravity before or in the melting zone in front of the energy beam.

17. (Amended) The device according to claim 1, characterised in that the drive unit for the workpiece makes it possible to achieve a variable rotation speed where the feed direction of the energy beam device and the powder supply in the direction of the axis of rotation are combined with the rotation speed of the workpiece to achieve spiral or other geometrical guidance of the linear focus onto the workpiece surface.

18. (Amended) The device according to claim 1, especially for engine blocks, consisting of a rotatable clamping device (1) for a cylinder block (2),.a laser treatment unit (3) with a beam head (4), which is connected to a powder supply device (5), and a transfer unit which positions the cylinder block (2) in front of the laser beam treatment unit (3) and a drive (6) to move the transfer unit along a transfer axis (10), characterised in that the clamping plane of the clamping device (1) is aligned perpendicular to the beam direction of the laser unit (3), that the laser unit (3) can be displaced perpendicular to the clamping plane of the clamping device (1) where the beam direction is perpendicular to the transfer axis (10) at an angle $\pm a = 0$ to 45° to the gravity vector, that the powder supply (5) either opens directly in the beam direction of the laser unit (3) or (seen in the feed direction) shortly before the beam incidence zone (12).

19. (Amended) The device according to claim 1, characterised in that a laser treatment unit (3) consists of several beam devices which can be inserted in a cylinder bore whereby several working surfaces are arranged on the cylinder wall (seen in the direction of the cylinder axis).

20. (Amended) The device according to claim 1, in that the powder supply device (5) consists of several feed devices which can be inserted in a cylinder bore where the feed openings are arranged one behind the other (seen in the direction of the cylinder axis) .

21. (Amended) The device according to claim 1, characterised in that the powder supply device consists of a screw conveyor, a conveyor belt or a vibrating conveyor chute.

REMARKS

Amendments are being made to claims 3, 6-11, and 14-21 to remove their multiple dependencies.

Please proceed to examine the application as amended herein.

Respectfully submitted,
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Date: September 25, 2001

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Amended Claims - Marked-Up Version

--3. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that the energy beam is split before the zone of incidence where a first part beam is deflected into the heating zone and melting zone and a second part beam is deflected behind the solidification front for thermal structural treatment.

--6. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that a ≥3 kW diode laser with a variable optical system to adjust the linear focal width of 4 - 15 mm is used to form the energy beam.

--7. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that before the beginning and at the end of a coating the linear focal width of the energy beam and the quantity of powder is reduced transverse to the feed direction.

--8. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that the workpiece is constructed as a hollow cylinder and rotates about the energy beam in the downhand position during the coating whereby the energy beam which is held in a fixed position relative to the direction of rotation, achieves a continuous feed movement during the rotation in the direction of the axis of rotation to produce a flat alloying zone.

--9. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that at the beginning of alloying the energy beam has a point structure and continually increases in size together with the quantity of powder until it has reached the complete linear focal width after a rotation of the workpiece.

--10. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that at the end of the alloying during the last rotation of the workpiece the linear focal width and the quantity of powder are continuously reduced to zero.

--11. (Amended) The method according to [one of the preceding Claims] claim 1, characterised in that a hollow cylinder made of Al or Mg alloys having a bore diameter of 60 - 120 mm is treated at a depth of up to 200 mm.

--14. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that the energy beam units next to one another sweep several lines of the working surface simultaneously, if necessary with several powder supply devices.

--15. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that the energy beam unit is located in a fixed position relative to the direction of rotation inside the rotatable workpiece clamping device connected to a drive unit where the energy beam is directed from the energy beam head onto the workpiece surface, that the powder supply device is located beside the energy beam device.

--16. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that the powder is blown onto surface facing the beam either in the direction opposite to the feed direction through the beam into the melting zone or is sprinkled loosely in the direction of gravity before or in the melting zone in front of the energy beam.

--17. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that the drive unit for the workpiece makes it possible to achieve a variable rotation speed where the feed direction of the energy beam device and the powder supply in the direction of the axis of rotation are combined with the rotation speed of the workpiece to achieve spiral or other geometrical guidance of the linear focus onto the workpiece surface.

--18. (Amended) The device according to [one of the preceding Claims] claim 1, especially for engine blocks, consisting of a rotatable clamping device (1) for a cylinder block (2),.a laser treatment unit (3) with a beam head (4), which is connected to a powder supply device (5), and a transfer unit which positions the cylinder block (2) in front of the laser beam treatment unit (3) and a drive (6) to move the transfer unit along a transfer axis (10), characterised in that the clamping plane of the clamping device (1) is aligned perpendicular to the beam direction of the laser unit (3), that the laser unit (3) can be displaced perpendicular to the clamping plane of the clamping device (1) where the beam direction is perpendicular to the transfer axis (10) at an angle $\pm a = 0$ to 45° to the gravity vector, that the powder supply (5) either opens directly in the beam direction of the laser unit (3) or (seen in the feed direction) shortly before the beam incidence zone (12).

--19. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that a laser treatment unit (3) consists of several beam devices which can be inserted in a cylinder bore whereby several working surfaces are arranged on the cylinder wall (seen in the direction of the cylinder axis).

--20. (Amended) The device according to [one of the preceding Claims] claim 1, in that the powder supply device (5) consists of several feed devices which can be inserted in a cylinder bore where the feed openings are arranged one behind the other (seen in the direction of the cylinder axis) .

--21. (Amended) The device according to [one of the preceding Claims] claim 1, characterised in that the powder supply device consists of a screw conveyor, a conveyor belt or a vibrating conveyor chute.--